MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2019 / 2020

PPS 0335 – PROBLEM SOLVING AND PROGRAMMING
(Foundation in Information Technology / Life Science)

11 MARCH 2020
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages (excluding the cover page) with 5 questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

Instructions: Attempt **ALL** questions. Write your answers in the Answer Booklet.

QUESTION 1 [10 Marks]

a. Solutions to problems can be derived using two mechanisms in general and they are *algorithmic* solutions and *heuristic* solutions. Briefly explain both mechanisms to solve problems.

(2 marks)

b. List **SIX (6)** steps of problem solving process.

(3 marks)

c. Before a program can be executed, we need to compile the program beforehand. Briefly explain the compilation process.

(2 marks)

d. Create a narrative algorithm that will prompt the user to enter two numbers and find their difference. The algorithm should consist **FIVE (5)** steps.

(3 marks)

QUESTION 2 [10 Marks]

a. What data types would you use to represent the following items:

    i. Number of cars as the basement parking space.
    ii. A letter grade on a final examination.
    iii. The average weight of flour produced by a factory in a month.
    iv. Your MMU student identification card (ID).

(2 marks)

b. Listed below are incorrect variable names. What is wrong with these variables names?

    i. *#foundationlifeisawesome*
    ii. *2020AsianGames*
    iii. *float*
    iv. *outlander vs xtrail*

(2 marks)

c. A C++ program contains the following declarations and initial assignments:
    int i=8, j=5, k;

Determine the value for each of the following expressions. Use the values initially assigned to the variables for each expression.

    i. $2*((i/5)+(4*(j-3))\%(i+j-2))$
    ii. $i<=j$
    iii. $k=(i+j)$

(3 marks)

Continued...

d. Write the following expression into C++ code.
   i. $p = \ln(xy) + \cos x/y + e^{x2} + \tan^{-1} y$
   ii. $p = e^{x2} + x^3\sqrt{\sin(xy)}$

(3 marks)

QUESTION 3 [10 Marks]

a. Construct Problem Analysis Chart (PAC) for a computer program to compute the volume of a right circular cone. The input data will be given by the user. Hint: volume $= \frac{1}{3} \pi r^2 h$

(3 marks)

b. Construct Input Processing Output (IPO) to find the sum S, average A, and the product P of three integers J, K, and L. Assumed that all integers are obtained from the user.

(3 marks)

c. What is a module? Why is module used in programs?

(2 marks)

d. Why it is important to test and validate a solution before converting it into a program?

(2 marks)

QUESTION 4 [10 Marks]

a. Sheneneh Jenkins teaches science class and her students are required to take three tests. She wants to write a program that can be used to calculate student's average test score. She also wants the program to congratulate the student enthusiastically if the average is greater than 95. Here is the algorithm:

   1. Get the first test score.
   2. Get the second test score.
   3. Get the third test score.
   4. Calculate the average.
   5. Display the average.
   6. If the average is greater than 95, congratulate the user.

   Write a pseudocode of based on the algorithm given above.

(3 marks)

b. Draw a flowchart for the problem in Question 4(a) above.

(3 marks)

c. In decision logic conversion, there are times when it is necessary to change the logic from positive to negative or vice versa in order to improve the efficiency or readability of a solution. List SEVEN (7) possible rules to convert positive logic to negative logic or vice versa.
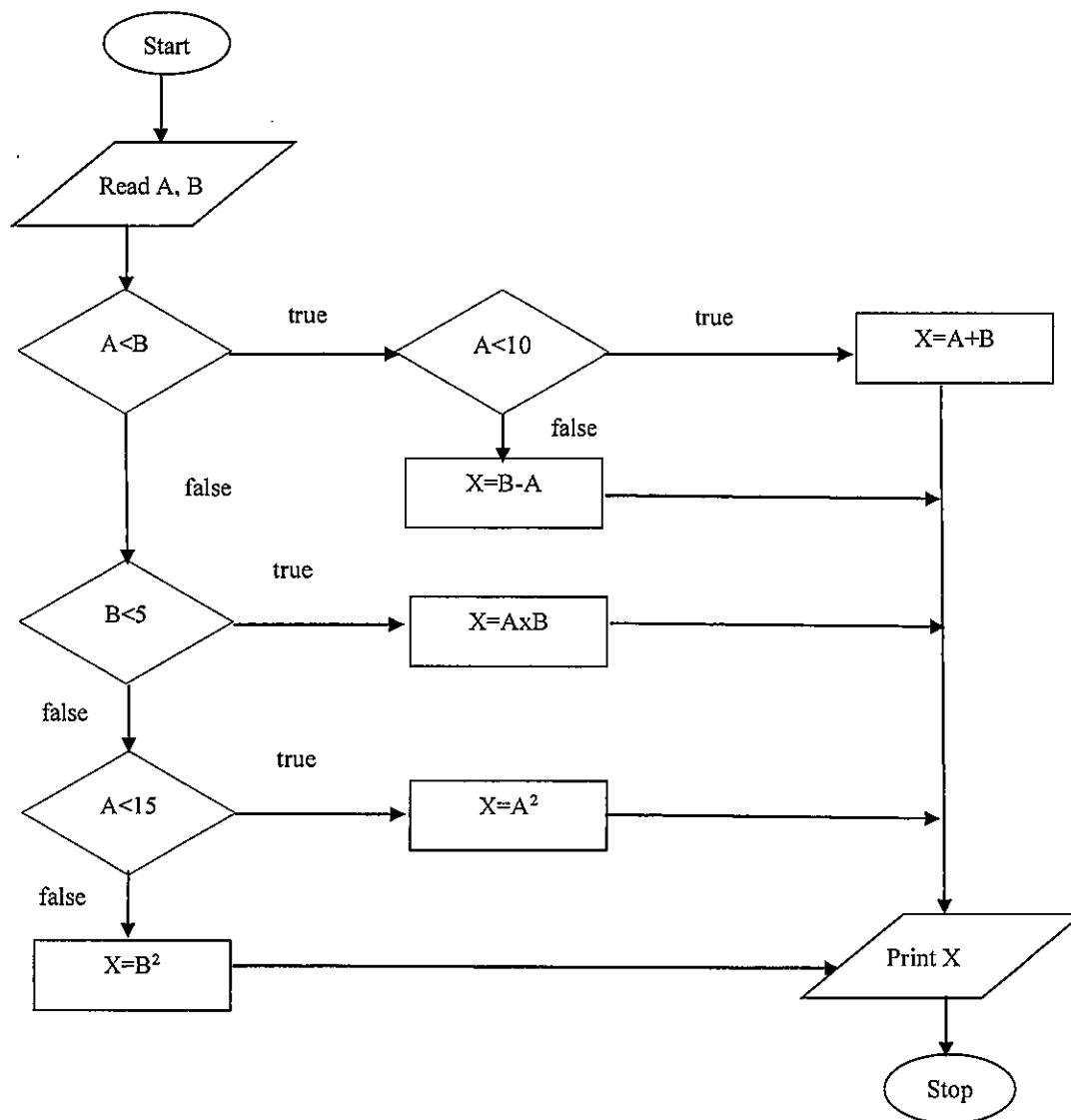
(4 marks)

QUESTION 5 [10 Marks]

a. Find the output of the following flowchart, refer **Figure 1** assuming inputs:
   i. $A = 15, B = 22$
   ii. $A = 18, B = 7$
   iii. $A = 9, B = 7$
   iv. $A = 2, B = 5$

Figure 1

(4 marks)

b. Write an algorithm to find the sum of the numbers from 10 to 100 in increment of 5. Use the *do..while* repetition control structure.

(3 marks)

c. Suppose we want to display all the digits 101,91,81,...,-89,-99,-109 in descending order. Use the repetition control structure *while* in order to write a pseudocode.

(3 marks)

End of Paper